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Annual Fish Passage Report - Rock Island Dam Columbia River, Washington, 1963

By Paul D. Zimmer and John H. Broughton

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United States Fish and Wildlife Service

Special Scientific Report--Fisheries No. 500

Washington, D.C.
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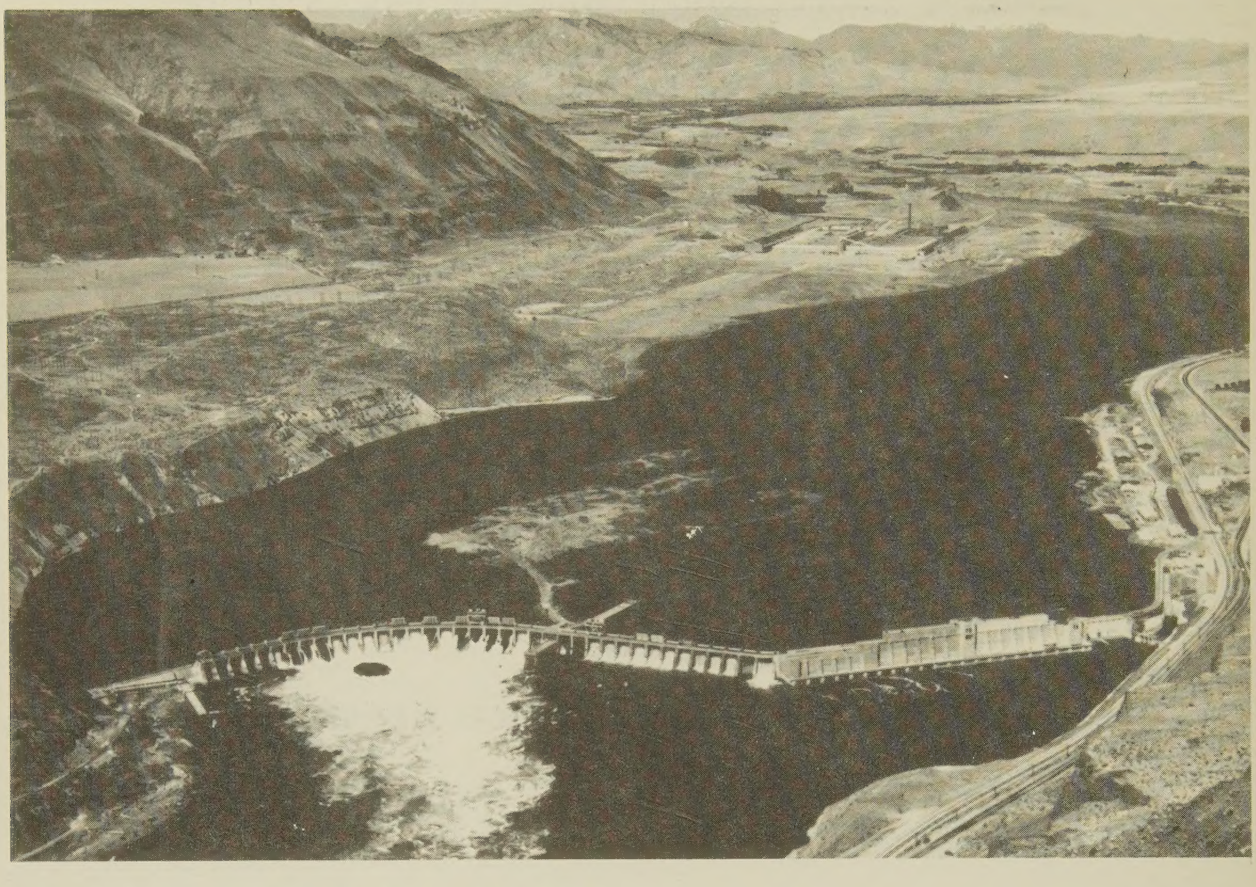

Rock Island Dam, Columbia River, Wash.

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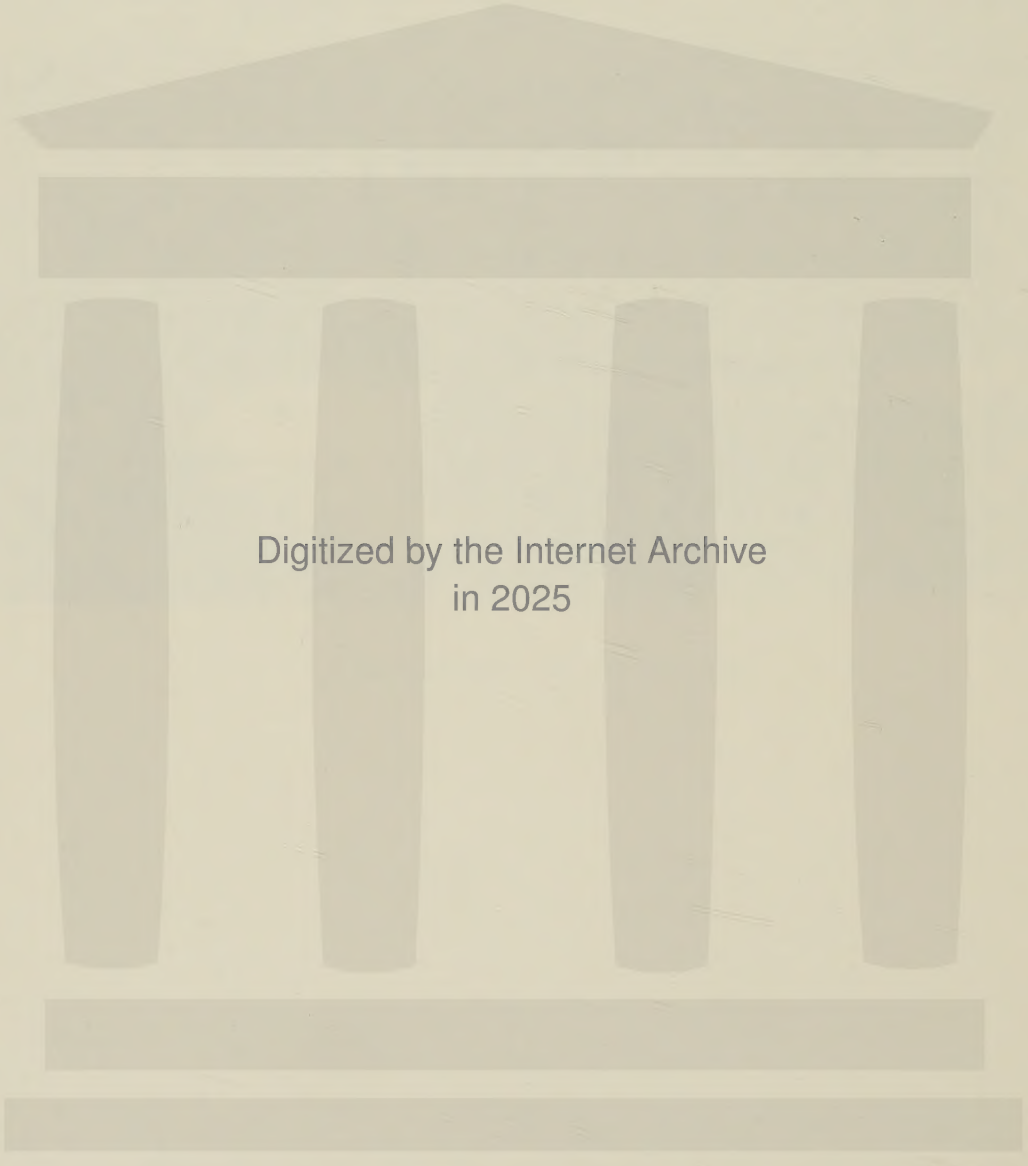
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ABSTRACT

Fish utilizing the three fishways at Rock Island Dam in 1963 were counted from May 1 to October 30. The 106,554 salmon and steelhead trout counted exceeded the 1962 count by about 34,800 fish.

The count of 34,688 chinook salmon recorded in 1963 was well above the mean of 16,777 for the 30-year period 1933-62 and exceeded the 1962 count by only 534 fish. The count of 64,768 sockeye salmon exceeded the 30-year mean of 51,164 and was about 35,500 more than recorded in 1962. The coho salmon count of 20 in 1963 was about 25 percent of the 30-year mean of 83 and 3 percent of the record count of 737 in 1962. The steelhead trout count of 7,078 in 1963 was more than twice the 30-year mean of 3,336 and about 500 less than the number recorded in 1962. Fish other than salmon and steelhead trout passing through the fishways at Rock Island Dam in 1963 numbered 137,367, as compared to 164,574 in 1962, and exceeded the 1963 count of salmon and steelhead trout by about 30,800 fish.

Of the 106,554 salmon and steelhead trout passing Rock Island Dam in 1963, about 2 percent had evidence of injury about the head or body.

INTRODUCTION

Rock Island Dam, located on the Columbia River about 12 miles downstream from Wenatchee, Wash., has been in operation since 1933. The dam is owned and operated by Chelan County Public Utility District No. 1.

This report on passage of fish at Rock Island Dam during 1963 provides information on operation of fishways and numbers of fish using them.

Rock Island Dam has three fishways: one located on the right bank, another on the left bank, and the third approximately in the center of the dam. The bank fish ladders began operating in 1933, and the middle ladder in 1936. All three ladders have been modified since then.

Fish ascending Rock Island Dam ladders have been counted annually since 1933, the longest continuous record of Columbia River fish counts.

Included in this report are comments covering various fishery investigations at Rock Island Dam during 1963.

COUNTING PROCEDURES

Fish counting in 1963 began on May 1 and ended October 30. From May 1 through August 31, fish were counted 16 hours each day, starting at 5 a.m. and ending at 9 p.m. From September 1 through October 30, counting was reduced to 14 hours each day, starting at 6 a.m. and ending at 8 p.m., to conform with the available daylight.

Fish counters were allowed a 15-minute rest period at the end of each hour; during all periods of noncounting, ladders were closed to fish.

A covering of one-half inch thick plexiglass is mounted on floats over each counting board. This eliminates sunglare and water surface disturbances and permits clear observation of each fish.

ENUMERATION OF FISH

All species of fish using the fishways at Rock Island Dam are identified and recorded. Salmon and steelhead recorded are discussed separately, and all other species are included in the category "Miscellaneous Fish."

Chinook Salmon, Oncorhynchus tshawytscha

The chinook salmon count in 1963 of 34,688 (jacks included) was well above the mean of 16,777 for the 30-year period 1933-62. It was about 2 percent greater than the 1962 count, but only 68 percent of the record count of 50,713 in 1957 (table 1). Monthly totals of chinook salmon given in table 2 show a peak movement of these fish in August. Maximum day's count of chinook salmon (jacks excluded) was 430 on August 5 (table 3), as compared to 570 fish on August 10, 1962. Tables 4 and

Note.--Paul D. Zimmer, Fishery Biologist (Management), and John H. Broughton, Fishery Technician, Bureau of Commercial Fisheries Program Office, Portland, Oreg.

Table 1.--Annual counts and periods of counting of salmon and steelhead trout at Rock Island Dam, 1933-63[1]

(Number of fish)

Year	Chinook salmon	Steelhead trout	Sockeye salmon	Coho salmon	Total	Period of count
1933	5,668	1,055	40,737	182	47,642	7/21- 9/23
1934	7,115	583	2,227	69	9,994	7/31-12/31
1935	16,305	5,418	14,013	11	35,747	1/1 -11/15
1936	7,290	2,373	16,500	0	26,163	5/5 - 9/29
1937	5,133	2,214	15,089	58	22,494	5/11-10/16
1938	5,795	2,399	17,095	78	25,367	4/12-10/29
1939	11,206	5,425	19,591	13	36,235	5/1 -12/9
1940	9,512	5,220	27,093	2	41,827	3/5 -12/10
1941	2,507	3,513	963	28	7,011	4/1 -12/8
1942	6,833	3,693	16,340	1	26,867	4/10-11/30
1943	11,129	2,315	17,522	15	30,981	4/5 -11/30
1944	3,364	1,338	5,035	186	9,923	4/12-11/17
1945	5,699	1,118	7,148	166	14,131	4/4 -12/17
1946	9,981	1,779	45,030	32	56,822	1/4 -11/5
1947	11,717	1,971	79,831	229	93,748	1/1 -11/27
1948	7,083	2,360	84,184	29	93,656	1/1 -11/16
1949	12,353	2,470	18,600	40	33,463	1/1 -11/15
1950	10,348	1,852	50,134	72	62,406	1/1 -11/23
1951	18,752	3,121	101,826	8	123,707	1/1 -11/18
1952	20,121	2,883	114,349	27	137,380	1/1 -11/18
1953	31,080	4,001	151,747	40	186,868	1/1 -12/31
1954	33,283	5,406	91,234	44	129,967	1/1 -12/31
1955	25,658	3,141	155,055	39	183,893	5/1 -9/30
1956	25,085	1,540	92,443	29	119,097	5/1 -9/29
1957	50,713	3,927	71,261	27	125,928	5/1 -9/28
1958	32,457	3,970	98,695	60	135,182	5/1 -9/30
1959	23,352	4,138	72,351	118	99,959	5/4 -9/30
1960	26,550	6,226	60,341	94	93,211	5/2 -10/29
1961	33,067	7,042	19,233	50	59,392	5/1 -10/27
1962	34,154	7,591	29,253	737	71,735	5/1 -10/27
1963	34,688	7,078	64,768	20	106,554	5/1 -10/30

[1] The above counts are now considered to be the official record of fish passing Rock Island Dam.

Table 2.--Monthly number of salmon and steelhead trout counted at Rock Island Dam, 1963

Species	May	June	July	August	Sept.	Oct.	Total
Chinook.....	3,063	2,318	3,473	4,966	1,094	365	15,279
Chinook (jacks)	1,353	2,703	1,605	3,234	8,538	1,976	19,409
Steelhead.....	639	85	205	1,916	2,634	1,599	7,078
Sockeye.....	4	399	58,556	5,627	173	9	64,768
Coho.....	0	0	0	0	15	5	20
Totals...	5,059	5,505	63,839	15,743	12,454	3,954	106,554

Table 3.--Maximum daily counts, salmon and steelhead, Rock Island Dam, 1963

Species	Date	Number of fish
Chinook (except jacks).	Aug. 5....	430
Chinook (jacks).....	Sept. 15..	568
Steelhead.....	Sept. 15..	201
Sockeye.....	July 15...	4,601
Coho.....	Sept. 18..	3

5 show semimonthly totals of the number and percentage of chinook salmon counted over each ladder. Of the chinook salmon (jacks excluded) that passed Rock Island Dam in 1963, 72.8 percent ascended the left ladder, while 13.7 and 13.5 percent ascended the middle and right ladders, respectively. In 1962, percentages of chinook salmon (jacks excluded) that used the left, middle and right ladders were 65.6, 13.5, and 20.9, respectively.

Chinook Salmon Jacks

Some chinook salmon return from the ocean as mature fish the year following their seaward migration and are referred to as "jacks." These fish are small, and males predominate. At Rock Island Dam in 1963, all chinook salmon 24 inches or less were counted as jacks. Each counting board has a marked section, 24 inches long, for gauging the length of small chinook salmon. The maximum daily count of 568 fish occurred on September 15 (table 3), about 5 weeks later than in 1962. The 19,409 fish recorded as jacks constituted 56.0 percent of the total chinook salmon run as compared to 20.8 percent in 1962.

Table 5 shows the number and percentage of chinook salmon jacks counted over each fish ladder. In 1963, 72.2, 11.1, and 16.7 percent of the jacks used the left, middle, and right ladders, respectively, compared to 68.1, 13.1, and 18.8 percent in 1962. Monthly totals are in table 2.

Table 4.--Semimonthly number and percent of chinook salmon counted over each fish ladder, Rock Island Dam, 1963

(Jacks not included)

Dates	Left ladder		Middle ladder		Right ladder		Total
	Number	Percent	Number	Percent	Number	Percent	Number
May 1-15	1,549	88.8	[1] 0	0	196	11.2	1,745
16-31	996	75.6	[1] 148	11.2	174	13.2	1,318
June 1-15	407	57.0	231	32.4	76	10.6	714
16-30	1,084	67.6	359	22.4	161	10.0	1,604
July 1-15	1,468	68.2	436	20.3	247	11.5	2,151
16-31	1,037	78.4	214	16.2	71	5.4	1,322
Aug. 1-15	2,386	70.0	414	12.1	609	17.9	3,409
16-31	1,166	74.9	230	14.8	161	10.3	1,557
Sept. 1-15	532	76.8	27	3.9	[2] 134	19.3	693
16-30	283	70.6	17	4.2	101	25.2	401
Oct. 1-15	115	65.0	7	3.9	55	31.1	177
16-30	95	50.5	6	3.2	87	46.3	188
Totals	11,118	72.8	2,089	13.7	2,072	13.5	15,279

[1] Middle ladder inoperative from May 1-20.
[2] Right ladder inoperative for several hours on Sept. 1. Closure was made in order to permit removal of debris.

Table 5.--Semimonthly number and percent of chinook salmon jacks counted over each fish ladder, Rock Island Dam, 1963

Dates	Left ladder		Middle ladder		Right ladder		Total
	Number	Percent	Number	Percent	Number	Percent	Number
May 1-15	205	89.5	[1] 0	0	24	10.5	229
16-31	744	66.2	[1] 253	22.5	127	11.3	1,124
June 1-15	880	56.4	447	28.6	234	15.0	1,561
16-30	606	53.1	393	34.4	143	12.5	1,142
July 1-15	508	58.9	142	16.5	212	24.6	862
16-31	552	74.3	99	13.3	92	12.4	743
Aug. 1-15	955	82.2	82	7.1	124	10.7	1,161
16-31	1,630	78.6	216	10.4	227	11.0	2,073
Sept. 1-15	3,947	81.2	154	3.2	[2] 759	15.6	4,860
16-30	2,777	75.5	209	5.7	692	18.8	3,678
Oct. 1-15	834	64.4	114	8.7	348	26.9	1,296
16-30	375	55.2	37	5.4	268	39.4	680
Totals	14,013	72.2	2,146	11.1	3,250	16.7	19,409

[1] Middle ladder inoperative from May 1-20.
[2] Right ladder inoperative for several hours on Sept. 1. Closure was made in order to permit removal of debris.

Sockeye Salmon, Oncorhynchus nerka (Blueback or red)

The sockeye salmon count of 64,768 was greater than the 30-year mean of 51,164 (table 1). In 1963, peak of the run was reached on July 15 when 4,601 fish were counted through the fishways at Rock Island Dam. In 1962, peak count of 2,541 occurred on July 21. Table 6 shows semimonthly totals of the number and percentage of sockeye salmon counted over each ladder.

Of the sockeye salmon passing Rock Island Dam in 1963, 65.6 percent ascended the left ladder, while 20.4 and 14.0 percent ascended the middle and right ladders, respectively. Distribution of sockeye to the three ladders in 1963 varies considerably from the 48.3 percent using the left, 21.7 percent the middle, and 30.0 percent the right ladders in 1962. Other data pertaining to the sockeye salmon daily counts are in tables 9-14. Monthly totals of sockeye salmon counted in 1963 are given in table 2. In 1963, about 92 percent of the total run of sockeye salmon passed through the ladders in July, compared to about 75 percent in 1962.

Coho Salmon, Oncorhynchus kisutch (Silver)

The coho salmon count of 20 fish in 1963 was about 25 percent of the 30-year mean of 83 fish and less than 3 percent of the 1962 peak count of 737 fish (table 1). Additional data are shown in tables 2, 7, and 9-14. Maximum day's count of three fish occurred on September 18 (table 3). In 1962, maximum day's count of 70 fish occurred on September 27. The first coho salmon was counted at Rock Island Dam on September 2, 1963, compared to August 27 in 1962. Of the coho salmon passing the dam in 1963, 40 percent used the left ladder, 40 percent the middle, and 20 percent the right (table 7). In 1962, percentages of coho were 77.3 percent, left ladder; 3.9 percent, middle; and 18.8 percent, right. Sizeable returns of coho salmon were expected in 1962 as a result of liberations from Winthrop National Fish Hatchery located on the Methow River upstream from Rock Island Dam. The low count of coho salmon at Rock Island Dam in 1963 was anticipated since there were no hatchery fish expected to return that year.

Table 6.--Semimonthly number and percent of sockeye salmon counted over each ladder, Rock Island Dam, 1963

Dates	Left ladder		Middle ladder		Right ladder		Total
	Number	Percent	Number	Percent	Number	Percent	Number
May 1-15	0	0	[1] 0	0	0	0	0
16-31	4	100.0	[1] 0	0	0	0	4
June 1-15	3	33.3	6	66.7	0	0	9
16-30	199	51.0	133	34.1	58	14.9	390
July 1-15	18,631	65.0	6,044	21.1	3,973	13.9	28,648
16-31	19,842	66.3	5,823	19.5	4,243	14.2	29,908
Aug. 1-15	3,186	65.1	1,081	22.1	629	12.8	4,896
16-31	464	63.5	137	18.7	130	17.8	731
Sept. 1-15	116	75.3	9	5.9	[2] 29	18.8	154
16-30	11	57.9	1	5.3	7	36.8	19
Oct. 1-15	7	77.8	1	11.1	1	11.1	9
16-30	0	0	0	0	0	0	0
Totals	42,463	65.6	13,235	20.4	9,070	14.0	64,768

[1] Middle ladder inoperative from May 1-20.
[2] Right ladder inoperative for several hours on Sept. 1. Closure was made in order to permit removal of debris.

Table 7.--Semimonthly number and percent of coho salmon counted over each ladder, Rock Island Dam, 1963

Dates	Left ladder		Middle ladder		Right ladder		Total
	Number	Percent	Number	Percent	Number	Percent	Number
May 1-15	0	0	[1] 0	0	0	0	0
16-31	0	0	[1] 0	0	0	0	0
June 1-15	0	0	0	0	0	0	0
16-30	0	0	0	0	0	0	0
July 1-15	0	0	0	0	0	0	0
16-31	0	0	0	0	0	0	0
Aug. 1-15	0	0	0	0	0	0	0
16-31	0	0	0	0	0	0	0
Sept. 1-15	1	33.3	0	0	[2] 2	66.7	3
16-30	3	25.0	7	58.3	2	16.7	12
Oct. 1-15	2	66.7	1	33.3	0	0	3
16-30	2	100.0	0	0	0	0	2
Totals	8	40.0	8	40.0	4	20.0	20

[1] Middle ladder inoperative from May 1-20.
[2] Right ladder inoperative for several hours on Sept. 1. Closure was made in order to permit removal of debris.

Steelhead Trout, Salmo gairdneri

The steelhead trout count of 7,078 fish in 1963 was slightly more than twice the 30-year mean of 3,336 (table 1).

In 1963, the greatest number of steelhead passed through the fishways in September when 2,634 fish were recorded (table 2). Peak monthly movement of these fish in 1962 was also in September when 3,429 fish were counted.

Of the steelhead passing Rock Island Dam in 1963, 76.3 percent used the left ladder, while 8.0 and 15.7 percent ascended the middle and right ladders, respectively (table 8). In 1962, percent utilization by ladder was left, 70.7; middle, 12.1; and right, 17.2 percent. Additional data pertaining to the movement of steelhead trout at Rock Island Dam are in tables 9-14.

Maximum day's count in 1963 was 201 on September 15 (table 3), compared to 284 on September 28 in 1962.

Miscellaneous Fish

In 1963, species of fish passing Rock Island Dam other than salmon and steelhead trout were counted as in former years. Data pertaining to these fish are in tables 15-20. No claims are made as to complete accuracy of identification of these fish; however, the degree of accuracy is consistent with that maintained at other dams on the Columbia River and the data may be used as a rough index of abundance of these fish. In 1963, about 138,000 fish other than salmon and steelhead trout passed the dam. In 1962, 165,000 such fish were counted. These species included large-scale sucker, Catostomus macrocheilus; long-nose sucker, Catostomus catostomus; squawfish, Ptychocheilus oregonense; Rocky Mountain whitefish, Prosopium williamsoni; Columbia River chub, Mylocheilus caurinus; chiselmouth, Acrocheilus alutaceus; carp, Cyprinus carpio; lamprey, Entosphenus tridentatus; shad, Alosa sapidissima; Dolly Varden trout, Salvelinus malma; and rainbow trout, Salmo gairdneri. The number of miscellaneous species of fish passing through the fishways in 1963 exceeded the count of salmon and steelhead by about 30,800 fish.

Table 8.--Semimonthly number and percent of steelhead trout counted over each ladder, Rock Island Dam, 1963

Dates	Left ladder		Middle ladder		Right ladder		Total
	Number	Percent	Number	Percent	Number	Percent	Number
May 1-15	287	74.4	[1] 0	0	99	25.6	386
16-31	126	49.8	[1] 23	9.1	104	41.1	253
June 1-15	34	47.9	17	23.9	20	28.2	71
16-30	9	64.3	2	14.3	3	21.4	14
July 1-15	32	56.1	13	22.8	12	21.1	57
16-31	106	71.6	19	12.8	23	15.6	148
Aug. 1-15	540	73.9	88	12.1	102	14.0	730
16-31	889	74.9	142	12.0	155	13.1	1,186
Sept. 1-15	1,002	83.4	56	4.6	[2] 144	12.0	1,202
16-30	1,167	81.5	100	7.0	165	11.5	1,432
Oct. 1-15	656	72.9	72	8.0	172	19.1	900
16-30	552	79.0	31	4.4	116	16.6	699
Total	5,400	76.3	563	8.0	1,115	15.7	7,078

[1] Middle ladder inoperative from May 1-20.

[2] Right ladder inoperative for several hours on Sept. 1. Closure was made in order to permit removal of debris.

Table 9.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, May, 1963

Date	Air temperatures[1]		Water temperatures[2]		Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	Max.	Min.						
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
May 1	68	40	48	48	126,700	37	0	0	17	54
2	67	40	46	46	122,400	27	0	0	19	46
3	65	40	45	45	125,800	85	0	0	10	95
4	54	41	45	45	125,800	20	0	0	20	40
5	61	51	45	45	131,900	37	0	0	25	62
6	68	51	46	46	134,500	32	0	0	17	49
7	67	50	47	47	131,900	100	0	0	15	115
8	73	42	47	46	143,900	84	0	0	37	121
9	72	43	48	47	145,800	97	0	0	31	128
10	82	40	48	47	152,800	140	0	0	35	175
11	80	43	48	47	132,700	223	0	0	29	252
12	80	55	48	47	124,100	300	0	0	35	335
13	70	44	49	47	122,400	262	0	0	30	292
14	75	45	49	49	97,000	141	0	0	19	160
15	70	54	50	49	93,600	389	0	0	47	436
16	82	60	50	49	106,300	170	0	0	30	200
17	85	50	50	49	110,100	177	0	0	25	202
18	90	50	50	50	111,700	351	0	0	26	377
19	88	52	51	50	115,000	213	0	0	19	232
20	92	57	51	50	119,900	192	0	0	27	219
21	90	57	52	51	123,300	197	0	0	20	217
22	90	62	52	51	180,400	70	0	0	15	85
23	84	62	52	51	212,200	16	0	0	0	16
24	80	60	51	50	219,000	15	0	0	4	19
25	85	65	52	51	201,100	15	0	0	5	20
26	80	55	52	52	203,700	156	0	0	16	172
27	82	60	53	52	200,900	238	3	0	21	262
28	86	57	53	52	221,200	211	0	0	15	226
29	92	62	53	52	226,900	113	0	0	12	125
30	90	62	53	52	235,600	106	0	0	3	109
31	78	57	53	52	237,500	202	1	0	15	218

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 10.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, June, 1963

Date	Air temperatures[1]		Water temperatures[2]		Stream flow	Chinook	Sockeye	Coho	Steel-head	Total
	Max.	Min.	Max.	Min.						
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
June 1	82	57	53	52	232,300	237	0	0	11	248
2	70	60	53	52	230,700	335	0	0	14	349
3	78	50	53	52	232,400	247	3	0	5	255
4	74	55	53	53	238,600	148	1	0	3	152
5	74	57	54	53	242,500	153	0	0	5	158
6	75	60	54	53	236,200	158	0	0	2	160
7	80	65	55	54	238,500	120	0	0	9	129
8	78	60	54	54	244,700	131	0	0	4	135
9	70	58	54	54	246,800	151	0	0	5	156
10	90	56	55	54	256,700	101	4	0	0	105
11	83	63	56	55	273,700	97	1	0	4	102
12	86	63	56	55	284,200	104	0	0	2	106
13	90	65	57	55	291,000	108	0	0	3	111
14	95	62	57	56	304,300	101	0	0	2	103
15	105	67	57	56	301,800	84	0	0	2	86
16	106	70	58	56	302,200	93	3	0	3	99
17	98	73	58	56	308,400	90	2	0	0	92
18	100	68	59	57	304,400	96	6	0	2	104
19	85	66	59	57	303,400	106	3	0	3	112
20	77	65	59	57	302,700	83	3	0	0	86
21	70	63	58	57	298,100	122	1	0	0	123
22	62	55	57	56	287,700	189	0	0	1	190
23	83	63	57	56	284,500	184	9	0	1	194
24	80	60	58	56	289,500	219	9	0	2	230
25	82	57	59	57	283,200	230	6	0	0	236
26	75	53	59	57	278,300	247	19	0	0	266
27	80	55	58	57	287,100	249	33	0	0	282
28	60	50	58	57	264,400	312	71	0	0	383
29	70	52	58	57	252,100	235	89	0	1	325
30	76	54	58	57	248,300	291	136	0	1	428

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 11.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, July, 1963

Date	Air temperatures[1] Max.	Air temperatures[1] Min.	Water temperatures[2] Max.	Water temperatures[2] Min.	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
July 1	89	54	58	57	242,100	286	285	0	3	574
2	92	66	60	58	251,700	222	287	0	2	511
3	94	62	60	58	246,200	307	484	0	1	792
4	92	70	60	59	240,500	243	521	0	1	765
5	89	67	60	59	242,200	314	1,023	0	5	1,342
6	85	65	60	59	239,200	279	1,401	0	0	1,680
7	83	63	59	59	231,700	228	1,719	0	9	1,956
8	80	56	60	59	225,600	152	1,291	0	2	1,445
9	88	56	59	59	239,100	151	1,238	0	5	1,394
10	80	64	59	58	231,500	140	1,819	0	3	1,962
11	80	65	60	58	235,500	100	1,971	0	5	2,076
12	90	65	60	59	218,700	133	2,893	0	1	3,027
13	94	65	60	59	214,300	164	4,567	0	3	4,734
14	86	70	60	59	217,000	164	4,548	0	5	4,717
15	79	62	60	59	201,700	130	4,601	0	12	4,743
16	88	58	61	60	217,700	123	2,986	0	5	3,114
17	88	72	61	60	223,700	142	3,300	0	4	3,446
18	92	65	61	60	226,700	128	2,653	0	1	2,782
19	94	62	62	60	228,200	114	3,572	0	7	3,693
20	93	65	62	60	210,700	176	3,116	0	8	3,300
21	90	68	62	61	200,600	123	2,734	0	6	2,863
22	78	65	62	61	199,000	191	2,725	0	13	2,929
23	82	55	62	61	183,200	144	1,814	0	12	1,970
24	78	60	61	60	176,700	66	886	0	2	954
25	84	60	61	60	154,400	110	841	0	5	956
26	95	62	61	60	130,900	40	475	0	6	521
27	95	69	61	60	131,900	66	633	0	10	709
28	95	68	62	60	130,700	68	1,015	0	11	1,094
29	93	69	63	61	130,700	238	1,267	0	15	1,520
30	93	65	63	61	130,500	194	1,138	0	18	1,350
31	83	62	63	61	125,200	142	753	0	25	920

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 12.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, August, 1963

Date	Air temperatures[1]		Water temperatures[2]		Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	Max.	Min.						
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
Aug. 1	85	63	63	61	126,600	133	490	0	16	639
2	90	65	63	61	123,800	232	380	0	17	629
3	97	63	63	62	114,500	322	496	0	18	836
4	101	72	64	62	119,800	530	706	0	34	1,270
5	96	71	64	63	121,100	524	513	0	44	1,081
6	98	70	65	63	111,700	287	469	0	33	789
7	95	68	65	63	113,100	154	360	0	33	547
8	101	67	65	64	107,700	98	222	0	39	359
9	95	70	65	64	104,800	180	242	0	40	462
10	96	77	65	64	103,400	300	199	0	48	547
11	98	77	-	-	106,100	529	152	0	44	725
12	95	67	-	-	105,600	203	132	0	70	405
13	99	72	65	64	107,400	288	154	0	96	538
14	85	67	64	63	111,800	290	192	0	106	588
15	88	61	64	63	116,400	500	189	0	92	781
16	90	63	65	63	116,000	546	58	0	64	668
17	93	67	64	63	115,800	517	74	0	108	699
18	90	70	64	62	111,500	295	70	0	115	480
19	82	58	64	63	107,400	284	67	0	89	440
20	81	62	63	62	106,000	259	51	0	111	421
21	85	59	63	62	108,700	212	71	0	137	420
22	82	63	63	62	107,400	129	48	0	66	243
23	78	62	63	62	104,600	132	55	0	69	256
24	80	60	63	62	102,000	185	33	0	83	301
25	78	55	63	62	98,000	206	38	0	64	308
26	80	53	63	61	81,900	107	53	0	57	217
27	88	63	64	62	85,200	128	28	0	47	203
28	90	61	63	62	86,300	65	32	0	44	141
29	91	58	63	62	75,000	224	28	0	53	305
30	93	60	64	62	60,000	268	13	0	49	330
31	98	65	64	63	65,900	73	12	0	30	115

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 13.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, September, 1963

Date	Air temperatures[1]		Water temperatures[2]		Stream flow	Chinook	Sockeye	Coho	Steel-head	Total
	Max.	Min.	Max.	Min.						
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
Sept. 1	86	70	64	63	54,900	162	9	0	48	219
2	85	68	64	62	34,000	240	39	1	37	317
3	85	60	64	64	37,900	239	14	0	57	310
4	93	58	64	63	27,900	294	24	0	88	406
5	95	69	64	63	56,200	387	18	0	82	487
6	93	65	65	63	64,800	246	12	1	73	332
7	97	67	65	64	54,000	256	5	0	57	318
8	91	69	65	64	54,300	361	7	0	58	426
9	97	65	65	64	54,400	457	4	0	36	497
10	89	69	65	64	57,800	522	4	0	86	612
11	96	64	65	64	74,300	391	1	0	91	483
12	91	69	65	64	74,600	527	2	0	89	618
13	82	67	64	64	45,300	342	3	0	114	459
14	75	52	64	63	44,800	477	2	0	85	564
15	72	48	63	63	63,200	652	10	1	201	864
16	65	55	63	63	71,400	348	5	0	125	478
17	75	48	63	63	80,800	297	2	0	101	400
18	77	53	63	62	61,600	224	0	3	53	280
19	80	49	64	62	96,900	170	0	2	58	230
20	85	54	64	63	60,600	224	0	2	72	298
21	80	56	63	63	53,800	238	3	0	69	310
22	86	57	64	63	54,400	410	1	0	54	465
23	75	57	64	63	53,400	500	1	0	141	642
24	78	49	64	63	45,200	374	1	2	170	547
25	85	54	64	63	45,600	228	2	1	154	385
26	85	57	64	63	45,300	173	1	1	104	279
27	88	60	64	63	45,200	283	1	0	113	397
28	90	65	64	63	45,300	192	0	1	75	268
29	93	70	64	63	45,500	194	0	0	68	262
30	85	60	64	63	66,700	224	2	0	75	301

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 14.--Daily air and water temperatures, stream flows, and fish counts, Rock Island Dam, October, 1963

Date	Air temperatures[1]		Water temperatures[2]		Stream flow	Chinook	Sockeye	Coho	Steel-head	Total
	Max.	Min.	Max.	Min.						
	°F.	°F.	°F.	°F.	C.f.s.	Number	Number	Number	Number	Number
Oct. 1	82	62	64	64	45,600	201	1	0	52	254
2	81	54	64	63	45,600	196	0	1	44	241
3	77	60	63	63	45,600	181	0	1	74	256
4	63	60	63	63	45,500	112	0	0	53	165
5	61	54	63	62	54,400	68	0	0	72	140
6	64	51	62	62	36,400	76	1	0	79	156
7	70	46	62	61	36,300	84	0	0	35	119
8	71	46	62	62	54,100	127	0	0	54	181
9	72	50	62	61	53,300	76	0	0	63	139
10	73	55	62	61	36,300	62	0	0	63	125
11	75	55	62	61	45,400	57	0	0	81	138
12	75	54	62	61	36,800	61	2	0	48	111
13	74	55	62	61	36,300	25	1	0	50	76
14	71	60	62	61	26,900	78	4	0	60	142
15	79	57	62	62	53,200	69	0	1	72	142
16	77	57	62	61	36,400	48	0	0	53	101
17	70	50	62	61	36,800	28	0	0	60	88
18	65	42	62	61	36,700	28	0	0	66	94
19	64	34	61	60	45,500	40	0	0	39	79
20	61	42	61	60	36,200	52	0	0	66	118
21	70	44	61	60	35,500	50	0	0	55	105
22	58	52	60	60	44,500	51	0	0	45	96
23	65	34	60	59	36,000	52	0	0	38	90
24	63	55	59	59	36,100	62	0	0	35	97
25	55	42	59	58	36,500	64	0	1	40	105
26	57	35	58	58	45,300	75	0	1	50	126
27	49	30	58	57	53,700	100	0	0	36	136
28	55	37	57	-	44,300	87	0	0	45	132
29	57	35	57	57	36,100	58	0	0	34	92
30	55	40	57	56	36,300	73	0	0	37	110

[1] Air temperatures were taken with maximum and minimum thermometer.
[2] Water temperatures were taken with a thermograph located in the middle ladder.

Table 15.--Miscellaneous fish counted, Rock Island Dam, May 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
May 1	17	0	75	0	0	0	0	0	0	92
2	50	1	62	0	0	0	0	0	0	113
3	22	0	30	0	0	0	0	0	0	52
4	4	0	48	0	0	0	0	0	0	52
5	1	0	45	2	0	0	0	0	0	48
6	4	0	46	0	0	0	0	0	0	50
7	6	5	48	0	0	0	0	0	0	59
8	6	5	50	0	0	0	0	0	0	61
9	59	5	71	0	0	0	0	0	0	135
10	251	9	40	0	0	0	0	0	0	300
11	370	3	32	0	0	0	0	0	0	405
12	83	8	36	0	0	0	0	0	0	127
13	33	6	60	0	0	0	0	0	0	99
14	2	7	50	0	0	0	0	0	0	59
15	43	3	31	1	0	0	0	0	0	78
16	91	4	37	0	0	0	0	0	0	132
17	102	1	41	0	0	0	0	0	1	145
18	328	23	50	0	0	0	0	0	1	402
19	611	45	78	2	0	0	0	0	0	736
20	752	62	35	3	0	0	0	0	0	852
21	552	53	156	0	0	0	0	0	0	761
22	920	78	63	1	0	0	0	0	0	1,062
23	844	34	79	0	0	0	0	0	0	957
24	221	19	20	1	0	0	0	0	0	261
25	107	21	47	0	0	0	0	0	0	175
26	149	34	84	0	0	0	0	0	0	267
27	146	38	30	2	0	0	0	0	0	216
28	581	123	13	0	0	0	0	0	0	717
29	707	137	29	0	0	0	0	0	0	873
30	326	70	17	5	0	0	0	0	0	418
31	216	64	13	8	0	0	0	0	0	301
Total	7,604	858	1,516	25	0	0	0	0	2	10,005

Table 16.--Miscellaneous fish counted, Rock Island Dam, June 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
June 1	143	53	18	10	0	0	0	0	0	224
2	48	21	25	4	0	0	0	0	0	98
3	35	41	26	0	0	0	0	0	0	102
4	60	55	28	0	1	0	0	0	0	144
5	679	163	41	0	0	0	0	1	0	884
6	476	137	52	12	0	0	0	0	0	677
7	781	181	46	8	0	0	0	0	0	1,016
8	1,546	252	50	19	0	0	0	0	0	1,867
9	1,736	196	44	38	0	0	0	0	0	2,014
10	1,651	174	19	123	0	1	0	0	0	1,968
11	3,091	455	19	418	0	0	0	0	3	3,986
12	1,866	346	46	291	0	0	0	0	0	2,549
13	501	223	42	88	0	0	0	0	0	854
14	640	231	13	78	1	0	0	0	0	963
15	217	200	5	62	2	0	0	0	0	486
16	403	270	25	80	1	2	0	0	0	781
17	326	245	20	31	0	2	0	0	0	624
18	708	320	11	96	1	2	0	0	0	1,138
19	1,166	331	13	108	0	0	0	0	0	1,618
20	791	187	14	26	0	0	0	0	0	1,018
21	362	93	16	10	0	1	0	0	0	482
22	226	66	40	6	0	0	0	0	0	338
23	181	63	41	6	1	0	0	0	0	292
24	731	300	19	44	0	0	0	0	3	1,097
25	790	191	26	8	1	1	0	0	0	1,017
26	1,634	278	25	42	0	0	0	0	1	1,980
27	518	123	19	8	0	1	0	0	0	669
28	135	57	43	9	0	3	0	0	2	249
29	66	43	71	2	0	1	0	0	0	183
30	146	136	52	18	0	0	0	0	0	352
Total	21,653	5,431	909	1,645	8	14	0	1	9	29,670

Table 17.--Miscellaneous fish counted, Rock Island Dam, July 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
July 1	402	148	35	38	0	0	0	0	0	623
2	3,976	639	19	190	0	2	0	0	0	4,826
3	1,425	298	22	74	3	4	0	0	0	1,826
4	1,211	315	6	60	0	2	0	1	1	1,596
5	809	108	9	24	0	3	0	0	0	953
6	445	75	23	22	0	0	0	0	0	565
7	561	72	33	12	0	0	0	0	1	679
8	138	59	30	12	3	5	0	0	0	247
9	170	44	27	6	0	0	0	0	0	247
10	148	44	8	7	1	0	0	0	0	208
11	126	45	18	8	0	1	0	0	0	198
12	329	75	17	8	0	0	0	1	0	430
13	797	149	24	41	0	0	0	0	0	1,011
14	794	111	11	57	3	2	0	0	0	978
15	189	67	16	15	2	0	0	0	0	289
16	122	45	18	5	0	1	0	0	0	191
17	264	111	16	19	0	0	0	0	0	410
18	163	53	2	2	1	0	0	0	0	221
19	248	42	11	3	5	3	0	0	2	314
20	136	62	12	5	0	0	1	0	0	216
21	365	95	20	122	1	1	0	0	1	605
22	822	220	15	49	6	7	0	1	0	1,120
23	384	108	29	29	6	4	0	0	0	560
24	98	21	53	6	1	0	0	1	1	181
25	42	32	54	17	0	2	1	0	0	148
26	27	15	62	8	0	2	0	0	0	114
27	169	61	88	42	0	0	0	0	0	360
28	828	100	93	79	1	0	0	0	0	1,101
29	1,413	68	58	58	7	1	0	0	0	1,605
30	875	48	52	57	5	0	0	0	0	1,037
31	266	49	57	87	4	1	0	0	0	464
Total	17,742	3,379	938	1,162	49	41	2	4	6	23,323

Table 18.--Miscellaneous fish counted, Rock Island Dam, August 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
Aug. 1	354	42	65	19	4	3	0	0	0	487
2	224	19	66	21	7	4	0	0	2	343
3	390	36	81	28	1	2	0	0	1	539
4	349	34	97	56	3	5	0	0	0	544
5	386	82	83	51	1	1	0	0	1	605
6	810	48	74	34	0	12	0	1	0	979
7	671	49	93	38	1	14	0	0	0	866
8	435	56	118	20	5	10	0	0	0	644
9	446	16	116	29	6	19	0	0	0	632
10	359	14	88	19	8	27	0	0	1	516
11	498	12	83	30	3	28	0	0	0	654
12	288	9	130	18	11	10	0	0	0	466
13	449	6	84	11	6	34	0	0	1	591
14	796	23	118	18	10	24	0	0	0	989
15	845	54	157	128	8	91	0	0	0	1,283
16	229	23	20	15	11	41	0	0	0	339
17	731	17	30	22	5	46	0	1	0	852
18	620	15	55	17	5	53	0	2	1	768
19	305	8	51	20	3	65	0	0	1	453
20	233	10	55	10	1	61	0	0	0	370
21	389	15	59	9	9	56	0	0	1	538
22	544	26	105	25	7	77	0	0	1	785
23	881	31	148	22	4	68	0	1	0	1,155
24	971	51	77	37	4	48	0	0	1	1,189
25	1,106	41	65	43	2	19	0	0	1	1,277
26	665	41	118	20	9	43	0	0	0	896
27	1,067	66	108	30	3	48	0	0	2	1,324
28	850	24	98	35	3	54	0	0	1	1,065
29	987	43	69	71	4	77	0	0	0	1,251
30	1,401	47	81	87	1	22	0	0	0	1,639
31	1,070	66	67	237	1	50	0	0	0	1,491
Total	19,349	1,024	2,659	1,220	146	1,112	0	5	15	25,530

Table 19.--Miscellaneous fish counted, Rock Island Dam, September 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
Sept. 1	1,234	63	54	51	2	24	0	0	1	1,429
2	1,646	79	115	61	2	78	0	0	0	1,981
3	1,501	61	97	162	8	30	0	0	0	1,859
4	676	72	231	91	6	43	0	0	2	1,121
5	962	179	203	318	4	47	0	0	0	1,713
6	849	97	138	174	4	30	0	0	2	1,294
7	805	105	164	79	3	18	0	0	4	1,178
8	759	115	169	109	3	117	0	0	0	1,272
9	422	59	134	73	2	79	0	0	0	769
10	693	92	206	63	5	46	0	0	0	1,105
11	897	64	154	56	4	18	0	0	0	1,193
12	461	33	131	21	2	125	0	0	0	773
13	541	40	193	20	3	66	0	0	0	863
14	728	52	230	20	9	6	0	0	0	1,045
15	461	44	200	21	11	25	0	0	0	762
16	330	35	194	23	1	15	0	1	0	599
17	505	67	170	14	2	28	0	0	0	786
18	751	100	224	16	7	59	0	0	0	1,157
19	616	110	339	39	1	35	0	0	0	1,140
20	639	122	205	24	4	56	0	0	1	1,051
21	978	184	196	19	2	57	0	0	0	1,436
22	1,087	220	104	112	3	103	0	0	0	1,629
23	1,017	180	127	34	7	48	0	1	0	1,414
24	536	142	117	23	2	54	0	0	1	875
25	578	175	166	16	3	26	0	0	1	965
26	735	203	163	16	5	17	0	0	1	1,140
27	1,114	202	222	22	1	28	0	0	0	1,589
28	873	105	211	17	0	5	0	0	0	1,211
29	698	106	283	61	0	56	0	0	0	1,204
30	543	109	270	62	1	36	0	0	0	1,021
Total	23,635	3,215	5,410	1,817	107	1,375	0	2	13	35,574

Table 20.--Miscellaneous fish counted, Rock Island Dam, September 1963

(Number of fish)

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
Oct. 1	385	106	320	31	1	25	0	0	0	868
2	351	205	460	38	2	45	0	0	0	1,101
3	274	178	280	91	3	29	0	0	0	855
4	146	50	267	26	3	27	0	0	0	519
5	160	23	259	27	1	9	0	0	0	479
6	235	18	238	2	0	7	0	0	0	500
7	448	43	247	12	3	2	0	0	0	755
8	66	29	308	31	8	0	0	0	0	442
9	81	40	262	33	1	7	0	0	0	424
10	132	49	246	8	0	2	0	0	1	438
11	321	61	169	17	3	3	0	0	0	574
12	652	58	263	22	2	5	0	0	1	1,003
13	580	103	164	7	6	5	0	0	0	865
14	352	71	233	28	2	10	0	0	0	696
15	211	37	177	8	0	9	0	0	1	443
16	85	43	208	1	0	10	0	0	2	349
17	97	23	187	4	1	14	0	0	0	326
18	216	38	181	7	2	7	0	0	0	451
19	130	20	158	1	2	7	0	0	0	318
20	182	35	194	0	0	12	0	0	0	423
21	191	31	188	1	1	4	0	0	0	416
22	30	12	84	0	0	3	0	0	0	129
23	8	10	145	2	0	2	0	0	0	167
24	7	8	83	0	0	2	0	0	0	100
25	3	1	86	0	0	6	0	0	0	96
26	4	3	72	0	0	0	0	0	1	80
27	20	5	50	0	0	4	0	0	0	79
28	43	1	71	0	0	0	0	0	2	117
29	4	2	101	0	0	0	0	0	1	108
30	26	11	107	0	0	0	0	0	0	144
Total	5,440	1,314	5,808	397	41	256	0	0	9	13,265

WEATHER AND RIVER DISCHARGE DATA

Headwater and tailwater elevations are plotted on figures 1 and 2. Air temperatures were taken twice daily by maximum and minimum thermometer. A continuous record of water temperatures was taken by thermograph at the middle fish ladder. Daily records of weather conditions and stream flows are shown in tables 9-14. Average daily river discharge data are plotted on figure 3. Maximum daily discharge of 308,400 c.f.s. on June 17 was 18,900 c.f.s. less than the 1962 record high discharge of 326,900 c.f.s. on June 5. Maximum water temperature in 1963 of 65° F. occurred August 6-10, 13, 16, and September 6-12. In 1962, maximum water temperature of 65° F. occurred on July 28 and 29.

ACTIVITIES AND OBSERVATIONS

Wanapum Dam was completed in 1963, and subsequent filling of the reservoir materially altered the fish approach conditions to the Rock Island Dam fishways. The ability of fish to locate the fishways at Rock Island Dam, or any other dam, depends in large part upon the influence of fishway flows on existing tailwater conditions. In 1963, modifications were made to the middle and left ladders for fishway operation with the Wanapum Dam reservoir encroachment. An evaluation study of effects of Wanapum reservoir encroachment on fish passage at Rock Island Dam is to begin in 1964 as required by Federal Power Commission order of October 24, 1962.

Prior to 1963, changes in tailwater conditions at Rock Island Dam were quite uniform in their seasonal variations. Normally, highest tailwater conditions occurred in May and June with a reasonably consistent and steady lowering of the water level through August, September, and October. During the fish counting season in 1962, highest tailwater elevation of 575.9 occurred in June; the lowest elevation, 548.4, on October 6. In 1963, the highest tailwater elevation of 577.9 also occurred in June; however, the lowest tailwater elevation of 558.0 on May 14 (fig. 2) was 9.6 feet higher than the lowest reading in 1962. Most pronounced differences in tailwater conditions at Rock Island Dam between 1962 and 1963 occurred from July 1 to the end of the counting season in October. In 1962, tailwater elevation on July 1 was 569.8; by October 6, it had declined to 548.4. In 1963, tailwater elevation on July 1 was 573.6, 3.8 feet higher than in 1962; the lowest recorded between that date and the end of counting was 566.8 on October 18, or 18.4 feet higher than the previous year.

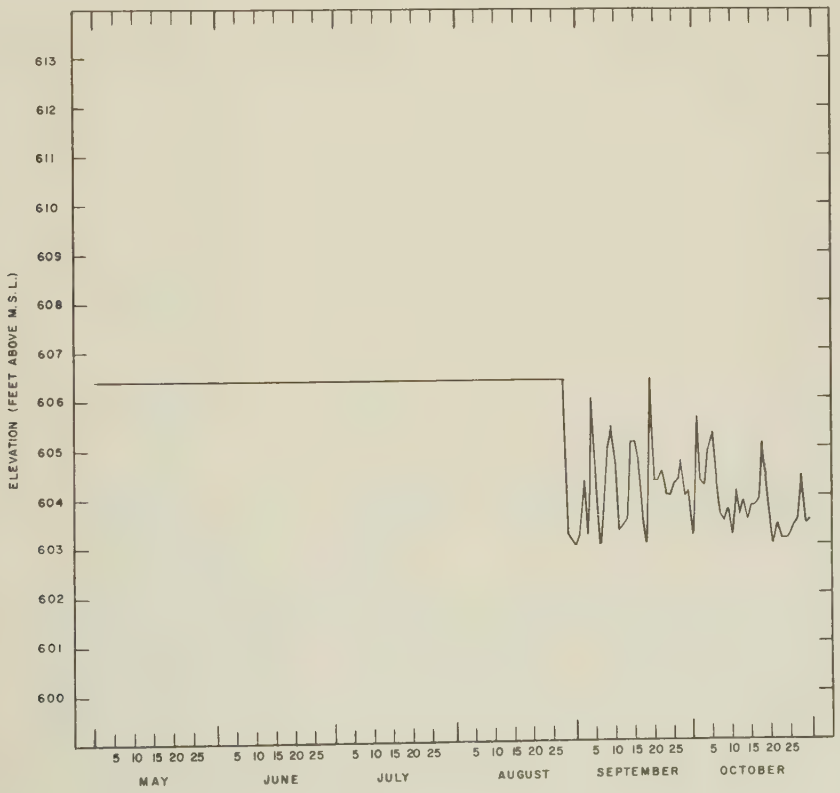

Figure 1.--Headwater elevations, Rock Island Dam, May 1 to October 30, 1963.

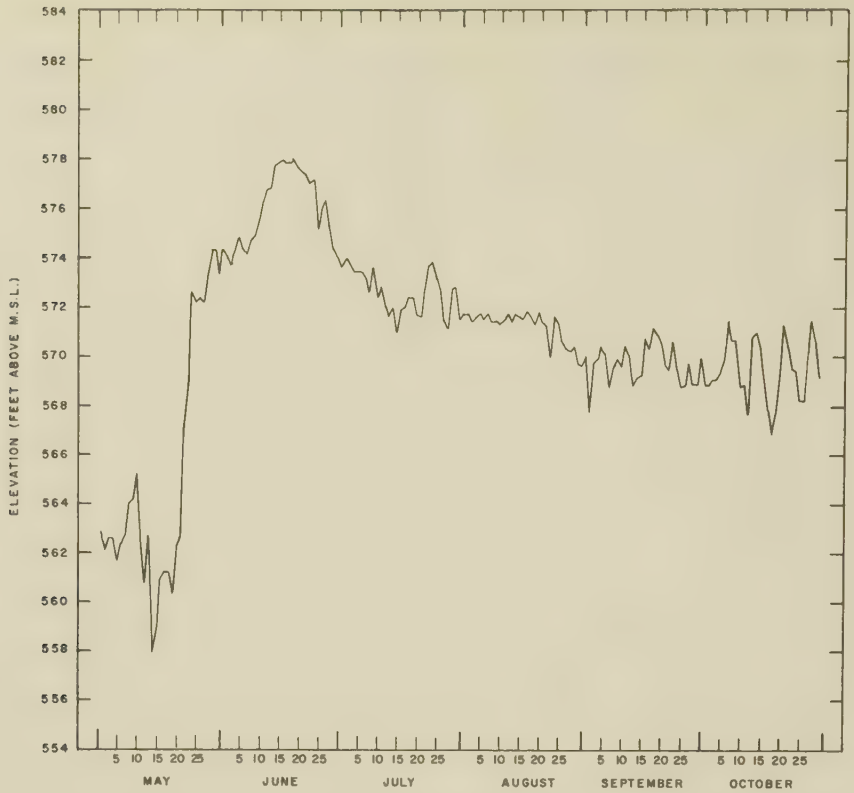

Figure 2.--Tailwater elevations, Rock Island Dam, May 1 to October 30, 1963.

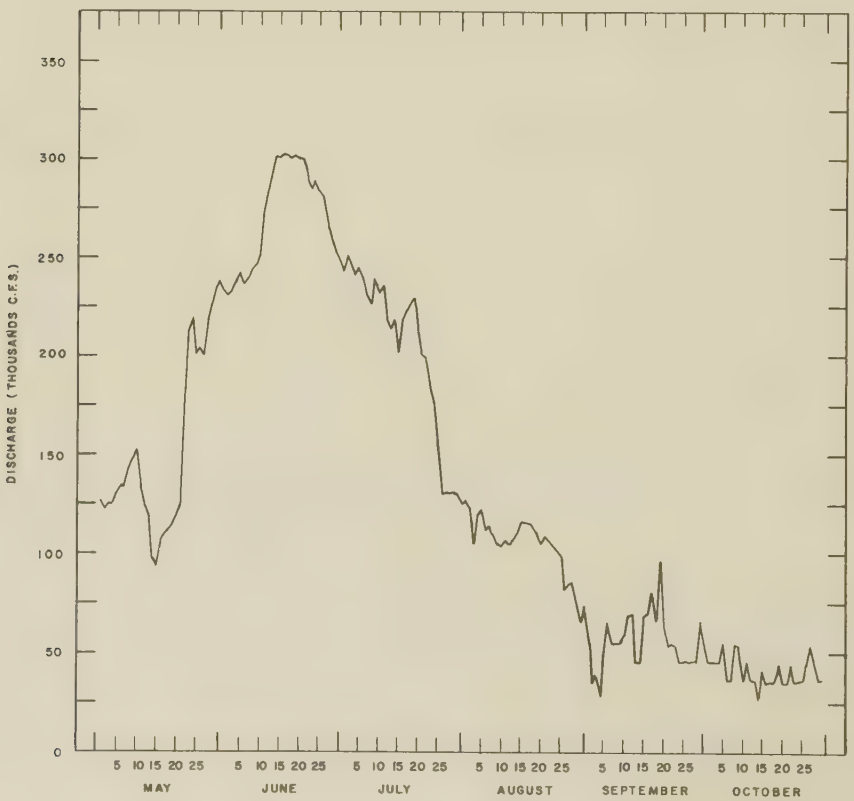

Figure 3.--Daily river discharge, Rock Island Dam, May 1 to October 30, 1963.

Movement of fish through the fishways at Rock Island Dam in 1963 also was affected by fluctuations of the Rock Island pool. On many occasions during September and October, the pool level was so low that insufficient water was available for proper operation of the fishways. This affected movement of fish to and through the ladders and required daily changes in fishway weir operations.

In comparing data on movement of fish through each of the fish ladders in 1963 (tables 4-8) with similar data for 1962, many differences are noted in the percent utilization by species in each of the three ladders.

During 1963, fish were observed with cuts or abrasions on their bodies. Of 106,554 salmon and steelhead observed as they passed over the counting boards, 2,209 fish, about

Table 21.--Injured fish observed at Rock Island Dam, May 1 to October 30, 1963

(Number of fish)

Date	Species	Total fish counted	Injured fish observed			
			Left ladder	Middle ladder	Right ladder	Total
May 1-15	Chinook	1,745	21	0	2	23
	Chinook jacks	229	1	0	0	1
	Steelhead	386	0	0	0	0
May 16-31	Chinook	1,318	22	3	1	26
	Chinook jacks	1,124	0	0	0	0
	Sockeye	4	0	0	0	0
	Steelhead	253	0	0	0	0
June 1-15	Chinook	714	9	5	2	16
	Chinook jacks	1,561	1	0	0	1
	Sockeye	9	0	0	0	0
	Steelhead	71	0	0	0	0
June 16-30	Chinook	1,604	10	11	1	22
	Chinook jacks	1,142	0	1	0	1
	Sockeye	390	1	0	0	1
	Steelhead	14	0	0	0	0
July 1-15	Chinook	2,151	36	15	7	58
	Chinook jacks	862	1	0	0	1
	Sockeye	28,648	150	63	43	256
	Steelhead	57	0	0	0	0
July 16-31	Chinook	1,322	18	4	5	27
	Chinook jacks	743	0	0	1	1
	Sockeye	29,908	829	205	209	1,243
	Steelhead	148	1	0	0	1
Aug. 1-15	Chinook	3,409	32	22	19	73
	Chinook jacks	1,161	0	0	1	1
	Sockeye	4,896	196	62	64	322
	Steelhead	730	1	1	0	2
Aug. 16-31	Chinook	1,557	32	12	6	50
	Chinook jacks	2,073	1	0	1	2
	Sockeye	731	27	8	4	39
	Steelhead	1,186	6	0	1	7
Sept. 1-15	Chinook	693	17	1	1	19
	Chinook jacks	4,860	3	0	0	3
	Sockeye	154	2	0	0	2
	Steelhead	1,202	0	0	0	0
	Coho	3	0	0	0	0
Sept. 16-30	Chinook	401	3	0	3	6
	Chinook jacks	3,678	0	1	0	1
	Sockeye	19	0	0	0	0
	Steelhead	1,432	1	0	0	1
	Coho	12	0	0	0	0
Oct. 1-15	Chinook	177	0	0	0	0
	Chinook jacks	1,296	0	0	0	0
	Sockeye	9	0	0	0	0
	Steelhead	900	0	0	1	1
	Coho	3	0	0	0	0
Oct. 16-30	Chinook	188	1	0	0	1
	Chinook jacks	680	0	0	0	0
	Steelhead	699	1	0	0	1
	Coho	2	0	0	0	0
Totals		106,554	1,423	414	372	2,209

2 percent, had injuries (table 21). This is compared to an injury incidence of about 0.5 percent in 1962. Since the counters could see only the top and one side of each fish, the incidence of injury might have been greater than observed. Of the total number of injured fish observed in 1963, about 64, 19, and 17 percent were recorded in the left, middle and right ladders, respectively. These percentages agree roughly with the percentages of the runs using each of the ladders.

As in 1962, the greatest number of injuries were observed on the large chinook and sockeye salmon. In the 2-week period July 16-31, 29,908 sockeye were counted through the fishways and injuries were noted on approximately 4 percent of the fish. In the same period in 1962, the incidence of injuries on sockeye salmon amounted to approximately 0.2 percent.

Circular cuts or abrasions were the most numerous injuries observed at Rock Island Dam in 1963. Pathologic examination of these injuries by personnel of College of Fisheries, University of Washington, indicated a very high incidence of Bacillus columnaris disease in the cut and abraded areas.

In 1963, 156 chinook salmon bearing numbered Peterson disk tags were counted through the fishways at Rock Island Dam. These fish had been trapped and tagged by Washington Department of Fisheries personnel at Priest Rapids Dam, located approximately 52 miles downstream from Rock Island Dam. Purpose of the tagging experiment was to determine proper time for trapping fall chinook salmon for stocking the Priest Rapids-Wanapum spawning channel.

One chinook salmon with a small red disk tag attached just below the dorsal fin, of a kind not employed at Priest Rapids, was observed at Rock Island.

On July 10, 11, 12, 17, 18, 19, and 24, 731 sockeye were trapped and identified with numbered Peterson disk tags at the left ladder at Rock Island Dam. These fish were released into the Rock Island pool approximately one-quarter mile above the dam. An additional 117 sockeye were trapped at the left ladder, marked with a pressure sprayed fluorescent paint, and released at the same location as the tagged fish. The painted mark was on the left side and about 1 inch in diameter. This tagging and marking program was conducted by Bureau of Commercial Fisheries as part of an evaluation study of fish passage facilities at Rocky Reach Dam, located approximately 26 miles upstream from Rock Island Dam.

The middle fish ladder at Rock Island Dam was inoperative from May 1-20, due to low tailwater conditions. During this period modifications were made to the fishway entrance and rise in tailwater on May 21 permitted resumption of ladder operation. Prior to counting on May 1, modifications also were made to the left fish ladder.

To secure information regarding night movement of fish at Rock Island Dam, limited counting was conducted at the left fish ladder on July 19, between 9 p.m. and 11:30 p.m. Artificial light was used to permit identification of fish moving over the counting board. Twenty-six sockeye, one chinook, ten suckers, twelve squawfish, and seven whitefish migrated up the ladder in that night period.

On August 8, modifications were made to the water supply conduit at the middle ladder to increase the flow of auxiliary water. An increase in fish movement through the ladder was noted.

On August 27, the west side entrance of the middle ladder was opened and additional auxiliary water provided.

The right ladder was closed on September 1, and reopened on the same day. Closure was made in order to permit removal of debris.

Frequent inspections were made of fishway operations by State and Federal personnel throughout the counting season.

SUMMARY

1. The total Rock Island count of salmon and steelhead in 1963 was 106,554, about 34,800 more than in 1962.

2. The chinook salmon count of 34,688 (jacks included) in 1963 greatly exceeded the mean of 16,777 for the 30-year period 1933-62 and was about 500 more than in 1962 and more than one-half the peak year of 1957. In 1963, 19,409 jacks were recorded, representing about 56 percent of that year's total of chinook salmon counted. In 1962, jacks represented about 21 percent of the chinook run.

3. The sockeye count of 64,768 in 1963 was about 13,600 more than the 30-year mean of 51,164 and exceeded the 1962 count by about 35,500 fish.

4. The coho salmon count of 20 fish in 1963 was about 25 percent of the 30-year mean of 83 fish and less than 3 percent of the 1962 count of 737 fish.

5. The steelhead count of 7,078 in 1963 was slightly more than twice the 30-year mean of 3,336 and was about 500 less than recorded in 1962.

6. In 1963, as in previous years, more salmon and steelhead used the left bank fish ladder than either of the other ladders.

7. Fish counting in 1963 began May 1 and terminated October 30. From May 1 through August 31, counting was conducted for 16 hours each day; from September 1 through October 30, 14 hours each day (6 a.m. to 8 p.m.) to conform with the daylight available.

8. In 1963, maximum number of salmonids counted in 1 day (4,743) was on July 15.

9. Season's total of fish other than salmon and steelhead trout passing Rock Island Dam in 1963 was 137,367, about 30,800 more than salmon and steelhead. The following were recorded: sucker, 95,423; squawfish, 15,221; whitefish, 17,240; chub, 6,266; carp, 351; shad, 2; Dolly Varden and rainbow trout, 66; and lamprey, 2,798.

10. All salmon and steelhead were examined for injuries as they passed over the counting boards. Only the top and one side could be seen by the counter. About 2 percent had injuries, and most of the injured fish were observed in July and August. Large chinook and sockeye salmon suffered a higher rate of injury than small chinooks, cohos, and steelheads. In 1962, about 0.5 percent exhibited some type of injury.

MS #1390

GPO 884-138

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